CLAIMS LISTING:

1. – 45. (cancelled).

46. (original) An optical communication receiver comprising:

An optical splitter having a splitter input and a plurality of splitter outputs, the optical splitter configured to receive an optical channel signal comprising a number K subchannel signals, and output K identical received channel signals;

K subchannel receivers, the e subchannel receiver comprising optical and digital circuitry configured to receive the k^{th} of said K identical received channel signals and a reference light beam having a subchannel frequency f_k, and output a first digital signal representative of in-phase and quadrature components of a first orthogonal polarization component associated with the subchannel frequency f_k, and also output a second digital signal representative of in-phase and quadrature components of a second orthogonal polarization component associated with the subchannel frequency f_k, the first and second digital signals containing information representative of a data stream used to modulate the k^{th} subchannel frequency; and

a receiver processor configured to receive said first and second digital signals and output said data stream.

47. (original) The optical communication receiver of claim 46, wherein the receiver further comprises:

a frequency calibration circuit configured to calibrate at least one light source to thereby maintain a frequency spacing of Δf between K adjacent subchannel light beams, the frequency calibration circuit receiving, as input, at least K subchannel light beams each characterized by a subchannel frequency f_k and outputting at least one frequency calibration control signal applied to at least one light source creating at least one of said K subchannel light beams.

48. (original) The optical communication receiver of claim 47, wherein the frequency calibration circuit comprises:

a first optical switch configured to select from among (a) said K subchannel light beams and (b) a reference light beam, to thereby output a selected beam;

an optical splitter configured to split the selected signal to first and second selected split beams;

an optical delay configured to receive the first selected split beam as input, delay the first selected split beam by a predetermined time delay T, and output a delayed first selected split beam;

an optical detector configured to receive the delayed first selected split beam and the second selected split beam, and output a digitized electrical signal that is proportional to $e^{j\omega T}$, where ω is the frequency of the selected beam;

a controller configure to receive the digitized electrical signal and output said at least one frequency calibration control signal.

49. (original) The optical communication receiver of claim 46, wherein the k^{th} subchannel receiver comprises:

a polarization beam splitter configured to receive and split the k^{th} of said K identical receiver channel signals into first and second orthogonal polarization components;

a first optical phase detector configured to receive the first orthogonal polarization component and the reference light beam having a subchannel frequency f_k as inputs, and output said first digital signal;

a second optical phase detector configured to receive the second orthogonal polarization component and the reference light beam having a subchannel frequency f_k as inputs, and output said second digital signal, and wherein

the first and second digital signals are input to said receiver processor.

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50. (original) The optical communication receiver of claim 49, wherein the k^{th} subchannel receiver further comprises:

a first variable optical delay configured to selectively delay the first orthogonal polarization component before it is input to the first optical phase detector;

a second variable optical delay configured to selectively delay the second orthogonal polarization component before it is input to the second optical phase detector,

wherein the first and second variable optical delays are controlled by said receiver processor.

51. (original) The optical communication receiver of claim 49, wherein each optical phase detector includes first and second integrate and dump filters configured to integrate detected analog respective in-phase and quadrature signals for an integrating period that is less than a symbol period to thereby produce respective detected analog in-phase and quadrature subchannel signals corresponding to said subchannel frequency f_k.

52. (original) The optical communication receiver of claim 46, wherein the receiver processor comprises:

a polarization mode dispersion (PMD) compensation control module configured to digitally compensate the first and second digital signals to thereby produce PMD-compensated first and second digital signals;

a synchronization and symbol timing module configured to produce optical detector control signals including at least one clock signal for controlling the subchannel receiver, based on at least one of the first and second digital signals and the first and second PMD-compensated digital signals; and

a data demodulation module configured to output the data stream that was used to modulate at least one of said K subchannels, based on the first and second PMD-compensated digital signals.

53. (original) The optical communication receiver of claim 52, wherein the synchronization and symbol timing module includes a Stokes-based timing error detector module.

54. (original) The optical communication receiver of claim 52, wherein the synchronization and symbol timing module also includes a Mueller & Muller timing error detector module, and wherein the Stokes-based timing error detector module is invoked first and the Muller and Muller timing error detector module is invoked thereafter.

55. (original) The optical communication receiver of claim 52, wherein the PMD compensation control module is configured to execute an iterative search procedure to find optimum coefficients of a rotation matrix for rotating the first and second digital signals to thereby create the PMD-compensated first and second digital signals.

56. (original) The optical communication receiver of claim 55, wherein, during each iteration, the search procedure calculates at least one metric for each of a plurality of candidate pairs of rotation angles, and selects the candidate pair of rotation angles corresponding to an optimization criterion for said at least one metric, to thereby calculate the coefficients of said rotation matrix, the iterations continuing 5 until a terminating condition is met.

57. (original) The optical communication receiver of claim 56, wherein a step size of the candidate pairs of rotation angles is adjusted at each iteration.

58. (original) The optical communication receiver of claim 52, wherein the receiver processor further comprises a frequency offset compensator.

59. (original) The optical communication receiver of claim 46, wherein the subchannel receiver comprises:

a polarization mode dispersion (PMD) compensator device configured to receive the k^{th} of said K identical receiver channel signals as input and output a PMD-compensated version of said k^{th} identical receiver channel signals, the PMD compensator device being controlled by at least one PMD device control signal from the receiver processor;

a polarization beam splitter configured to receive and split said PMD compensated version of said e identical receiver channel signal into first and second orthogonal polarization components;

a first optical phase detector configured to receive the first orthogonal polarization component and the reference light beam having a subchannel frequency f_k as inputs, and output said first digital signal;

a second optical phase detector configured to receive the second orthogonal polarization component and the reference light beam having a subchannel frequency f_k as inputs, and output said second digital signal, and wherein

the first and second digital signals are input to said receiver processor.

60. (original) The optical communication receiver of claim 59, wherein the subchannel receiver further comprises:

a first variable optical delay configured to selectively delay the first orthogonal polarization component before it is input to the first optical phase detector;

a second variable optical delay configured to selectively delay the second orthogonal polarization component before it is input to the second optical phase detector,

wherein the first and second variable optical delays are controlled by said receiver processor.

61. (original) The optical communication receiver of claim 59, wherein each optical phase detector includes first and second integrate and dump filters configured to integrate detected analog respective in-phase and quadrature signals for an integrating period that is less than a symbol period to thereby produce respective detected analog in-phase and quadrature subchannel signals corresponding to said subchannel frequency f_k.

62. (original) The optical communication receiver of claim 59, wherein the receiver processor comprises:

a polarization mode dispersion (PMD) compensation control module configured to produce said at least one PMD device control signal, based on the first and second digital signals;

a synchronization and symbol timing module configured to produce optical detector control signals including at least one clock signal for controlling the subchannel receiver, based on said first and second digital signals; and

a data demodulation module configured to output the data stream that was used to modulate the k^{th} subchannel, based on the first and second digital signals.

63. (original) The optical communication receiver of claim 62, wherein the synchronization and symbol timing module includes Mueller & Muller timing error detector module.

64. (original) The optical communication receiver of claim 62, wherein the PMD compensation control module is configured to execute an iterative search procedure to find optimum rotation angles for producing the PMD device control signals.

65. (original) The optical communication receiver of claim 64, wherein, during each iteration, the search procedure determines a candidate pair of

rotation angles, calculates said at least one metric for said candidate pair of rotation angles, stores the metric, and produces said at least one PMD device control signal that is applied to the PMD compensator device, for each candidate pair of rotation angles.

66. (original) The optical communication receiver of claim 65, wherein a step size governing selection of the candidate pairs of rotation angles is adjusted at each iteration.

67. (original) The optical communication receiver of claim 62, wherein the receiver processor further comprises a frequency offset compensator.

68. – 74. (cancelled).

75. (original) A frequency calibration system for calibrating a number K of laser light beams, each laser light beam having a frequency f_k , k= 1, 2, 3, . . ., K, the frequency calibration system comprising:

an optical switch system configured to select one from among the K laser light beams and a reference beam and output a selected beam;

a splitter disposed to receive the selected beam and output first identical first and second selected beams;

an optical detector configured to receive a delayed version of the first selected beam and the second selected beam, and output at least one electrical signal proportional to a phase difference between the two beams;

a controller configured to receive said at least one electrical signal and output at least one frequency calibration control signal to control at least one light source responsible for creating at least one of said plurality of laser light beams.

76. (original) The frequency calibration system of claim 75, wherein the optical switch system comprises a K:1 switch configured to select one from among said K light beams and a 2:1 switch configured a select from among the

reference light beam and said one from among said K light beams to thereby output said selected beam.

77. (original) The frequency calibration system of claim 75, wherein the first selected 5 beam is delayed by one symbol period.

78. (original) An iterative method for compensating for polarization mode dispersion (PMD) in an optical signal comprising:

(a) determining a candidate pair of rotation angles for adjusting a state of polarization of the optical signal;

(b) calculating at least one metric for said candidate pair of rotation angles

(c) storing the at least one metric and also outputting at least one PMD device control signal that is applied to a PMD compensator device into which the optical signal is input;

(d) repeating steps (a), (b) and (c) until metrics; for a predetermined set of candidate pairs have been calculated;

(e) finding the optimum metric and the optimum rotation angles corresponding to that metric; and

(f) outputting at least one PMD device control signal which corresponds to the optimum angles, to said PMD compensator device into which the optical signal is input.

79. (original) The method according to claim 78, wherein the metric is an envelope stability metric.

80. (original) The method according to claim 78, further comprising repeating steps (a) -(f) until a predetermined condition is met, and wherein a step size for the candidate pairs of rotation angles is adjusted at each iteration of steps (a)-(f).

81. (original) A method for compensating for polarization mode dispersion (PMD) in an optical signal having two orthogonal polarizations, the method comprising:

(a) determining a candidate pair of rotation angles for adjusting a state of polarization of the optical signal;

(b) calculating at least one metric for said candidate pair of rotation angles;

(c) storing the metric;

(d) performing steps (a), (b) and (c) until metrics for a predetermined set of candidate pairs have been calculated;

(e) finding the optimum metric and the optimum rotation angles corresponding to that metric, and then updating a rotation matrix having coefficients derived from the optimum rotation angles;

(f) digitally compensating for PMD by applying the rotation matrix to digitized signals representing the information set on the two orthogonal polarizations.

82. (original) The method according to claim 81, wherein the metric is an envelope stability metric.

83. (original) The method according to claim 81, further comprising, before step (f), 20 repeating steps (a) -(e) until a predetermined condition is met.

84. (original) The method according to claim 83, further comprising adjusting a step size for the candidate pairs of rotation angles at each iteration of steps (a)-(e).

85. – 87. (cancelled).